1. Publication Nº	2. Version	3. Date	5. Distribution
INPE-3136-PRE/527		Junho, 1984	☐ Internal ☒ External ☐ Restricted

4. Origin	Program
DGA/DIO	IONOSFERA

6. Key words - selected by the author(s)

IONOSPHERE
ELECTRON DENSITY PROFILES
IRI-79 MODEL

7. U.D.C.: *523.4-853*

8. Title *INPE-3136-PRE/527*

COMPARISON BETWEEN DENSITY PROFILES OBTAINED AT CACHOEIRA PAULISTA, BRAZIL, AND DEDUCED FROM IRI-79 MODEL

10. Nº of pages: *09*

11. Last page: *07*

12. Revised by

Y. Nakamura

9. Authorship *E. R. de Paula*
I.J. Kantor
A.C.R. de Souza
S.L.G. Dutra

Responsible author

13. Authorized by

Nelson de Jesus Parada
Director General

14. Abstract/Notes

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15. Remarks *This work was partially supported by the "Fundo Nacional de Desenvolvimento Científico e Tecnológico" under Contract FINEP-537/CT. This work is being submitted to "Solar Terrestrial Predictions Workshop", June 18-22, 1984, Meudon, France.*

COMPARISON BETWEEN DENSITY PROFILES OBTAINED AT CACHOEIRA PAULISTA, BRAZIL, AND DEDUCED FROM IRI-79 MODEL

E.R. de Paula, I.J. Kantor, A.C.R. de Souza and S.L.G. Dutra

Instituto de Pesquisas Espaciais - INPE
Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq
12200 São José dos Campos, S.P., Brasil

ABSTRACT

Average profiles of electron density from the International Reference Ionosphere model, and from ionograms of Cachoeira Paulista ($23^{o}S$, $45^{o}W$) were compared for the Months of March, June, September and December, 1978, for 00 and 14 hours, local time. Very good agreement was observed between the predicted and the observed profiles for all the analysed months and hours, except in the lower heights of the profiles and in certain height intervals.

1- INTRODUCTION

The objective of this work is to make a comparison between average profiles of the electron density obtained by IRI-79 model and those observed at Cachoeira Paulista.

This comparative study was done for 14:00 h and 00:00 h, local time, representing diurnal and nocturnal conditions respectively. The months of March (equinox), June (winter), September (equinox) and December (summer) of 1978 were selected as typical months for each season.

To obtain observed electron profiles N(h), good quality ionograms are necessary. The following numbers of selected ionograms were used to obtain the average profiles for each month.

For 00:00 h: 14 ionograms for March, 24 for June,
12 for September and 9 for December.

For 14:00 hs were selected 5 ionograms for June, only.

2- INTERNATIONAL REFERENCE IONOSPHERE IRI-79

This ionosphere model was developed by an international committee, (Rawer et al., 1978), to give average profiles of electron and positive ion density and ion and electron temperatures as a function of height. In this model the height lower limits are 80 Km at night and 65 Km daytime and the height upper limit is 1000 Km.

The f_0F_2 and $M(3000)F_2$ CCIR coeficients, ITU(1967 and 1964), are used by the IRI-79 model. These coeficients were determined from vertical sounding of ionosphere at a great number of sounding stations, located mainly in Northern Hemisphere, so it is important to compare IRI profiles with the observed ones in the Southern Hemisphere.

3- AVERAGE PROFILES N(h) FROM IONOGRAMS

The ionosonde frequency of Cachoeira Paulista ranges from 1 to 20 MHz. The resolution in the ionogram reduction was ±1.0 Km in h' (virtual height) and ±0.001 in log f, where f is the frequency in MHz.

The true-height profiles were determined using a computer program (Giese, 1979), based on Paul (1967) process. These profiles can present considerable errors below approximately 90 Km height and in the valley region, located between E and F layers.

4- COMPARISON BETWEEN IRI-79 AND OBSERVED PROFILES

The observed and the IRI-79 profiles for March, June, September and December 1978, are presented respectively in Figures 1, 2, 3 and 4. It should be observed that profiles for 14:00 h are available only for June.

A good agreement can be observed between the profiles for 00:00 h from 200 Km to 390 Km height for March (Figure 1), from 240 Km to 390 Km for June (Figure 2), from 270 Km to 340 Km for September (Figure 3) and from 220 Km to 410 Km for December (Figure 4).

A good agreement between profiles, for 14:00 h, can be noted from 90 Km to 360 Km, while great discrepancies occur below 90 Km.

5- CONCLUSIONS

In general, a very good agreement between IIR-79 and observed profiles is observed, except in certain height intervals, so IRI-79 model can be used for studies of global behavior of ionosphere in regions near Cachoeira Paulista.

Also, IRI-79 model can be used in studies of electromagnetic propagation, with some care in ionospheric valley region and in heights below 80 Km.

ACKNOWLEDGMENTS

The authors are grateful to Dr. K. Rawer for providing the magnetic tape of IRI-79 model.

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FIGURE CAPTIONS

Fig. 1 - Average profiles for 00:00 h for March, 1978.

Fig. 2 - Average profiles for 00:00 h and 14:00 h for June, 1978.

Fig. 3 - Average profiles for 00:00 h for September, 1978.

Fig. 4 - Average profiles for 00:00 h for December, 1978.

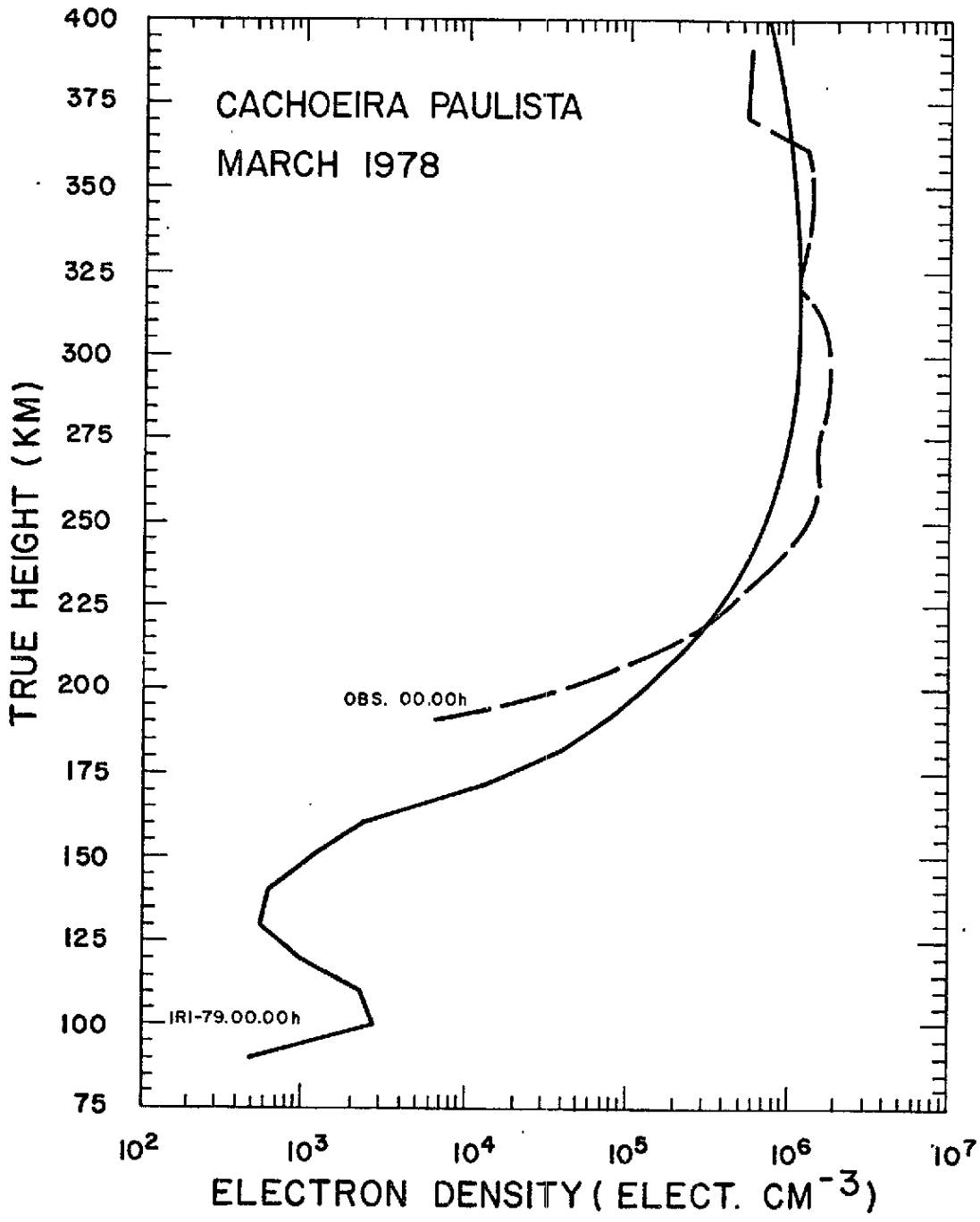
CACHOEIRA PAULISTA
MARCH 1978
OBS. 00.00h
IRI-79.00.00h
TRUE HEIGHT (KM)
400
375
350
325
300
275
250
225
200
175
150
125
100
75
10^2
10^3
10^4
10^5
10^6
10^7
ELECTRON DENSITY (ELECT. CM^{-3})

Fig. 1

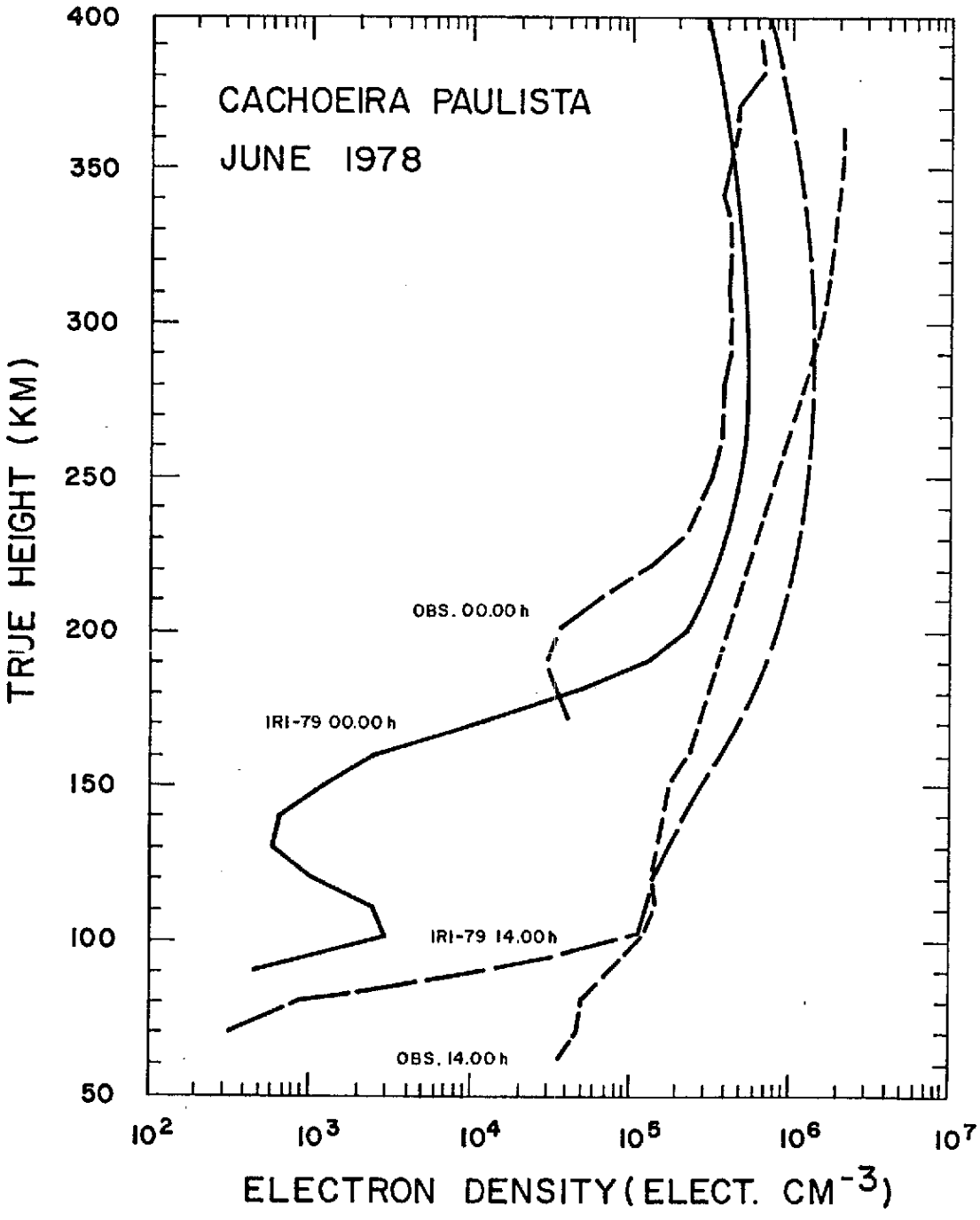
CACHOEIRA PAULISTA
JUNE 1978
TRUE HEIGHT (KM)
400
350
300
250
200
150
100
50
OBS. 00.00 h
IRI-79 00.00 h
IRI-79 14.00 h
OBS. 14.00 h
10^2
10^3
10^4
10^5
10^6
10^7
ELECTRON DENSITY (ELECT. CM^{-3})

Fig. 2

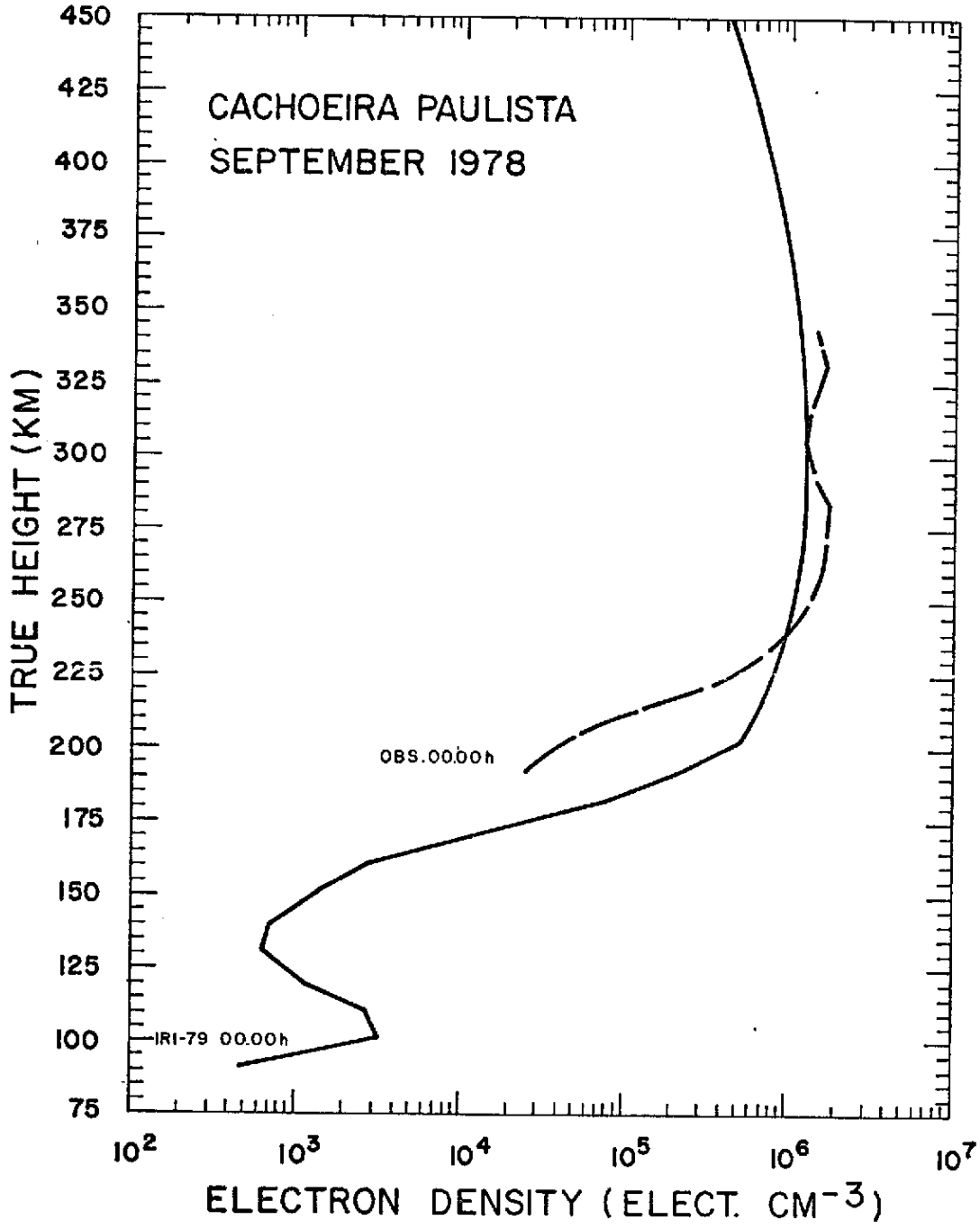
CACHOEIRA PAULISTA
SEPTEMBER 1978
OBS.00.00h
IRI-79 00.00h
TRUE HEIGHT (KM)
450
425
400
375
350
325
300
275
250
225
200
175
150
125
100
75
10^2
10^3
10^4
10^5
10^6
10^7
ELECTRON DENSITY (ELECT. CM^{-3})

Fig. 3

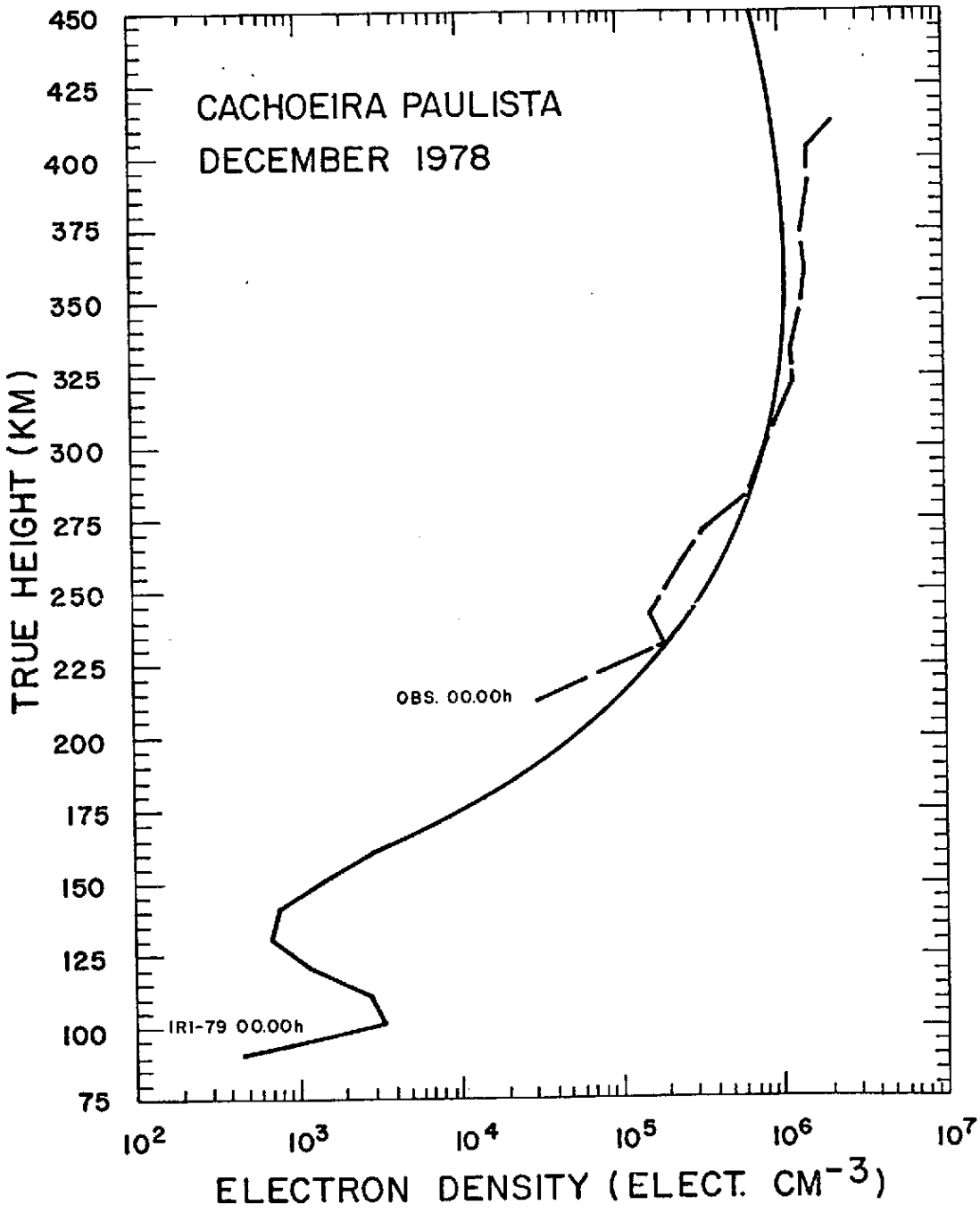
CACHOEIRA PAULISTA
DECEMBER 1978
OBS. 00.00h
IRI-79 00.00h
TRUE HEIGHT (KM)
450
425
400
375
350
325
300
275
250
225
200
175
150
125
100
75
10^2
10^3
10^4
10^5
10^6
10^7
ELECTRON DENSITY (ELECT. CM^{-3})

Fig. 4